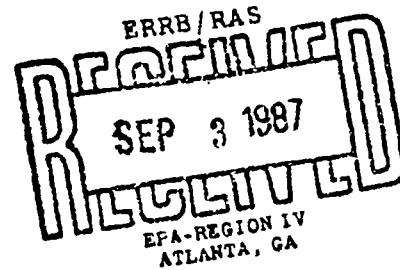


3 4 00060

Site:	
Break:	3 2
Other:	



FINAL REPORT
SAMPLING PLAN
BLUFF ROAD SITE
COLUMBIA, SOUTH CAROLINA

Prepared For

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, D.C. 20460

Work Assignment No.	:	353
EPA Region	:	IV
Site No.	:	4B15
Date Prepared	:	August 27, 1987
Contract No.	:	68-01-7331
CDM Federal Programs Corporation Document No.	:	T353-C04-FR-AZFD-3
Prepared By	:	Versar, Inc.
Work Assignment Project Manager	:	Scott Slagley
Telephone Number	:	(404) 873-2137
Primary Contact	:	Michelle Glenn
Telephone Number	:	(404) 347-2643



10925781

Table of Contents

1.0	Introduction.....	1
2.0	General Sampling Information.....	2
3.0	Air Quality Monitoring.....	4
3.1	General Site Survey.....	4
3.2	Target Area Survey.....	4
3.3	Quantitative Air Monitoring.....	5
4.0	Ground-Water Monitoring.....	7
4.1	Sample Contamination.....	7
4.2	Static Water Level Measurements.....	7
4.3	Well Purging Methods.....	8
4.4	Collection of Samples for Chemical Analyses.....	10
4.5	Field Measurements.....	14
4.6	Field Quality Control Samples.....	14
4.7	Sample Shipment.....	15
5.0	Surface Water, Sediment, and Surface Runoff Monitoring.....	17
5.1	Surface Water Monitoring.....	17
5.2	Stream and Surface Runoff Sediment Sampling.....	19
6.0	Soil Characterization Sampling.....	22
6.1	Soil Borings for Chemical Analysis.....	22
6.2	Soil Borings to Define Black Mingo Clay Formation.....	24
6.3	Special Requirements for Soil Sampling Activities.....	25
7.0	Aquatic Biota Survey.....	26
8.0	Decontamination.....	27
8.1	Equipment Decontamination Procedures.....	27
8.2	Personnel Decontamination Procedures.....	31
9.0	Field Documentation.....	32
9.1	Field Logbooks.....	32
9.2	Sample Identification.....	33
9.3	Photographs.....	33
9.4	Sample Documentation Forms.....	34

References.....	35
-----------------	----

Attachments

1. Recommended Sample Containers, Sample Preservation, Sample Holding Times, and Permissible Sample Types
2. Decontamination Procedures

Tables

1. Liquid Volume in an One-Foot Section of Well Casing.....	9
2. Order of Preferred Sample Collection.....	12
3. Planned Chemical Analysis	13

Figures

1. Existing Ground-water Monitoring System at The Bluff Road Site.....	3
2. Surface Water and Sediment Sampling Locations at Bluff Road Site...	18

1.0 INTRODUCTION

This sampling plan presents the procedures the contractor will use for collection of environmental samples during the performance of the Remedial Investigation field activities at the Bluff Road Site near Columbia, South Carolina. Sampling will be performed to characterize the waste present at the site, determine potential contaminant migration, and to determine potential off-site contaminant receptors. Results of the sampling activities will be inputted into other tasks required as part of the overall Remedial Investigation/Feasibility Study for this site.

All on-site activities will be conducted by trained monitoring specialists under the supervision of a monitoring supervisor. The monitoring supervisor will be responsible for all sampling efforts, including equipment availability and maintenance, ensuring proper procedures are followed, assisting in data collection, and sample shipment. Monitoring specialists will perform the sampling and support activities, record data, and ship the samples to the laboratory. On each monitoring team, at least one member will perform the duties of the Site Health and Safety Officer and will be responsible for overseeing activities related to proper donning and doffing of safety equipment, decontamination of equipment and sample containers, and ensuring that a sufficient stock of personnel safety equipment is maintained.

This sampling plan will follow the applicable U.S. EPA protocols for collection of samples. All internal QA requirements for sampling including sample blanks, duplicate samples, sample splits, and reagent blanks will be met.

2.0 GENERAL SAMPLING INFORMATION

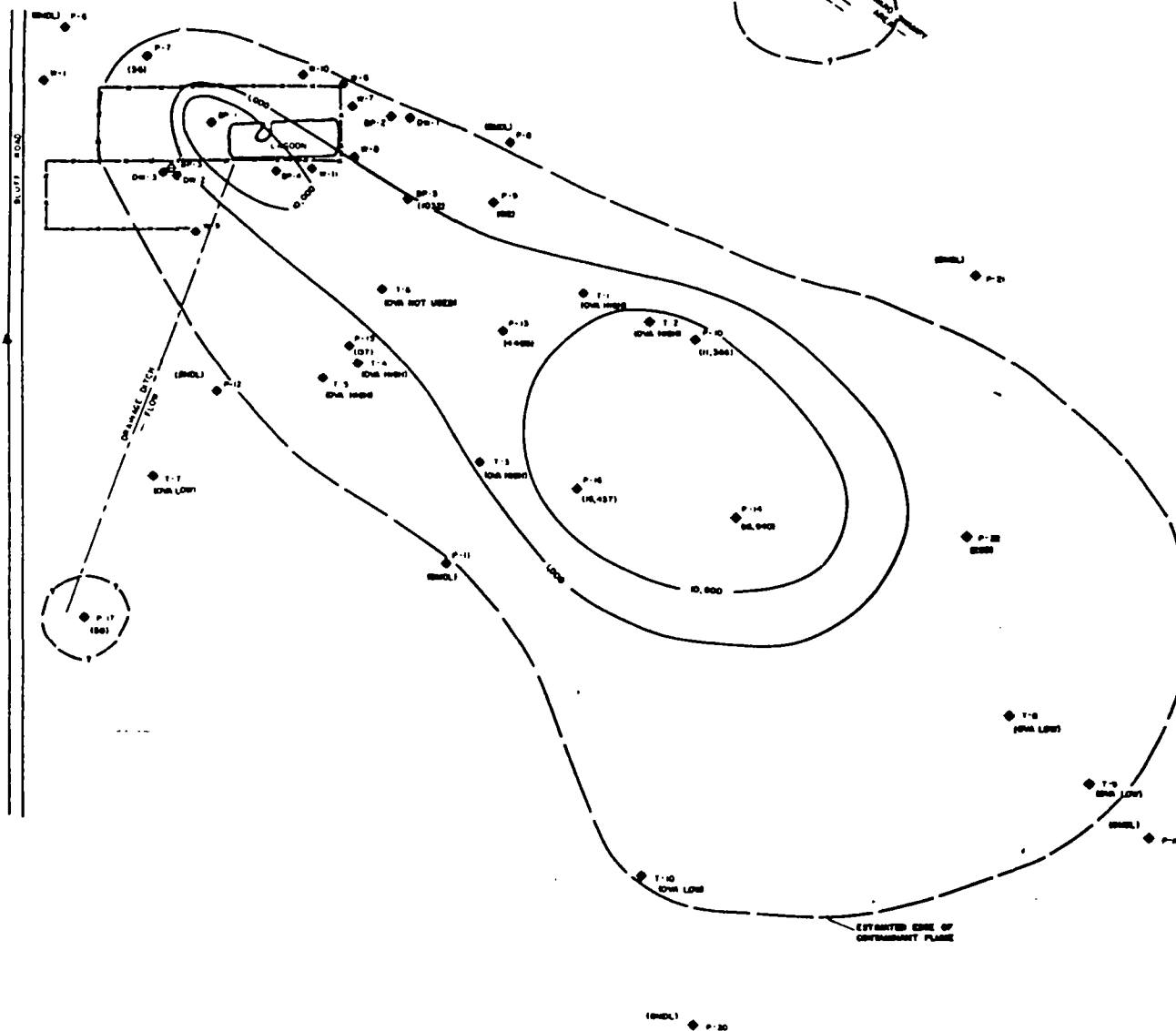
The field activities will be conducted in two phases. Initial (Phase I) site activities will require collection of (1) ambient air quality samples, (2) surface water samples, (3) sediment samples (4) subsurface soil samples, and (5) ground-water samples from selected existing monitoring wells (Figure 1).

Air quality sampling will include: (1) use of portable monitoring devices to identify any potential sources of organic vapors, and (2) quantification of air quality in the major areas of concern at the site.

The initial ground-water sampling will be designed to determine if (1) the contaminated ground-water plume has moved downgradient of the existing wells (i.e., P-19 and P-20) and (2) to determine if contamination other than volatile organic contamination exists in the ground water.

The second phase of site activities includes performing an aquatic biota survey and sampling ground water from any newly installed monitoring wells to locate the extent of the main body of the ground-water contaminant plume and to further define the extent of ground-water contamination around existing monitoring wells P-17 and P-18.

On-site sampling activities will be performed over an approximate period of three months. The duration of sampling activities will depend upon weather conditions and the scheduling of other tasks (e.g., installation of additional monitoring wells).



LEGEND

- ◆ DEEP WELL
- ◆ SONNET WELL
- ◆ SURFACE AQUIFER WELL
- ◆ TEST SONNET
- P-17
- ◆ TOTAL CONCENTRATION OF VOLATILE ORGANICS FROM DECEMBER 1983 SAMPLING
- (MDL) INDICATES RESULT BELOW METHOD DETECTION LIMIT
- 10,000— ESTIMATED CONCENTRATION CONTOUR 1000
- SON HIGH HIGH OVA READINGS ON SOIL SAMPLE
- SON LOW LOW OVA READINGS ON SOIL SAMPLE

0 100 200 300 400
SCALE IN FEET

REVISION			
NO.	DATE	BY	DESCRIPTION
1	1/23/84	AS	AS SHOWN
2	1/23/84	AS	AS SHOWN
3	1/23/84	AS	AS SHOWN
4	1/23/84	AS	AS SHOWN
5	1/23/84	AS	AS SHOWN
6	1/23/84	AS	AS SHOWN
7	1/23/84	AS	AS SHOWN
8	1/23/84	AS	AS SHOWN
9	1/23/84	AS	AS SHOWN
10	1/23/84	AS	AS SHOWN
11	1/23/84	AS	AS SHOWN
12	1/23/84	AS	AS SHOWN
13	1/23/84	AS	AS SHOWN
14	1/23/84	AS	AS SHOWN
15	1/23/84	AS	AS SHOWN
16	1/23/84	AS	AS SHOWN
17	1/23/84	AS	AS SHOWN
18	1/23/84	AS	AS SHOWN
19	1/23/84	AS	AS SHOWN
20	1/23/84	AS	AS SHOWN
21	1/23/84	AS	AS SHOWN
22	1/23/84	AS	AS SHOWN
23	1/23/84	AS	AS SHOWN
24	1/23/84	AS	AS SHOWN
25	1/23/84	AS	AS SHOWN
26	1/23/84	AS	AS SHOWN
27	1/23/84	AS	AS SHOWN
28	1/23/84	AS	AS SHOWN
29	1/23/84	AS	AS SHOWN
30	1/23/84	AS	AS SHOWN
31	1/23/84	AS	AS SHOWN
32	1/23/84	AS	AS SHOWN
33	1/23/84	AS	AS SHOWN
34	1/23/84	AS	AS SHOWN
35	1/23/84	AS	AS SHOWN
36	1/23/84	AS	AS SHOWN
37	1/23/84	AS	AS SHOWN
38	1/23/84	AS	AS SHOWN
39	1/23/84	AS	AS SHOWN
40	1/23/84	AS	AS SHOWN
41	1/23/84	AS	AS SHOWN
42	1/23/84	AS	AS SHOWN
43	1/23/84	AS	AS SHOWN
44	1/23/84	AS	AS SHOWN
45	1/23/84	AS	AS SHOWN
46	1/23/84	AS	AS SHOWN
47	1/23/84	AS	AS SHOWN
48	1/23/84	AS	AS SHOWN
49	1/23/84	AS	AS SHOWN
50	1/23/84	AS	AS SHOWN
51	1/23/84	AS	AS SHOWN
52	1/23/84	AS	AS SHOWN
53	1/23/84	AS	AS SHOWN
54	1/23/84	AS	AS SHOWN
55	1/23/84	AS	AS SHOWN
56	1/23/84	AS	AS SHOWN
57	1/23/84	AS	AS SHOWN
58	1/23/84	AS	AS SHOWN
59	1/23/84	AS	AS SHOWN
60	1/23/84	AS	AS SHOWN
61	1/23/84	AS	AS SHOWN
62	1/23/84	AS	AS SHOWN
63	1/23/84	AS	AS SHOWN
64	1/23/84	AS	AS SHOWN
65	1/23/84	AS	AS SHOWN
66	1/23/84	AS	AS SHOWN
67	1/23/84	AS	AS SHOWN
68	1/23/84	AS	AS SHOWN
69	1/23/84	AS	AS SHOWN
70	1/23/84	AS	AS SHOWN
71	1/23/84	AS	AS SHOWN
72	1/23/84	AS	AS SHOWN
73	1/23/84	AS	AS SHOWN
74	1/23/84	AS	AS SHOWN
75	1/23/84	AS	AS SHOWN
76	1/23/84	AS	AS SHOWN
77	1/23/84	AS	AS SHOWN
78	1/23/84	AS	AS SHOWN
79	1/23/84	AS	AS SHOWN
80	1/23/84	AS	AS SHOWN
81	1/23/84	AS	AS SHOWN
82	1/23/84	AS	AS SHOWN
83	1/23/84	AS	AS SHOWN
84	1/23/84	AS	AS SHOWN
85	1/23/84	AS	AS SHOWN
86	1/23/84	AS	AS SHOWN
87	1/23/84	AS	AS SHOWN
88	1/23/84	AS	AS SHOWN
89	1/23/84	AS	AS SHOWN
90	1/23/84	AS	AS SHOWN
91	1/23/84	AS	AS SHOWN
92	1/23/84	AS	AS SHOWN
93	1/23/84	AS	AS SHOWN
94	1/23/84	AS	AS SHOWN
95	1/23/84	AS	AS SHOWN
96	1/23/84	AS	AS SHOWN
97	1/23/84	AS	AS SHOWN
98	1/23/84	AS	AS SHOWN
99	1/23/84	AS	AS SHOWN
100	1/23/84	AS	AS SHOWN

Figure 1 Existing Ground-water Monitoring System
at the Bluff Road Site

3.0 AIR QUALITY MONITORING

On-site investigations will encompass three regimes of air quality monitoring to meet the following objectives: (1) general site survey to establish and verify levels of personnel and public protection, (2) target area survey to qualitatively identify potential sources of organic vapor emissions, and (3) quantitative air monitoring to document emissions from specific areas of concern.

3.1 General Site Survey

The site perimeter and two perpendicular traverses through the site will be surveyed prior to initiating the major on-site investigations using a flame ionization detector (OVA) and photoionization detector (HNU) to document ambient organic vapor levels. The OVA will be calibrated to a methane standard and will be equipped with a strip chart recorder to document survey findings. The HNU will be calibrated to a benzene standard. All calibration events will be documented in a field log book. Additionally, readings at perimeter and traverse stations at 100 foot intervals will be recorded in a survey log. Air temperature and the estimated wind velocity and direction will be determined during the survey. These data will be presented to the Site Manager and will be used to establish preliminary levels of protection for the on-site areas of interest.

3.2 Target Area Survey

Site survey activities will include specific point screening at all sample collection efforts near the fenced site area using both

OVA and HNu detectors. Breathing level monitoring will be conducted using both OVA and HNu detectors before and during all sampling and well installation activities to confirm the appropriateness of the designated level of protection, and to provide the basis for any changes in level of protection status.

All environmental samples collected from the site will be screened (except those samples collected for volatile organic compound (VOC) analysis) with both OVA and HNu detectors prior to sample containerization by positioning the detector inlet probes directly above the samples. The readings will be used to determine the degree of precaution needed in handling procedures, and to establish additional packaging and shipping requirements.

Adequacy of personnel protection during monitoring well drilling and installation will be evaluated by area surveillance with both OVA and HNu detectors. Any sustained reading above the initial level of protection criteria will warrant discontinuation of installation activities until all personnel have the appropriate safety equipment. The appropriate action levels and safety equipment are detailed in the site specific Health and Safety Plan.

Once drilling operations are complete, downhole monitoring will be performed and levels of organic vapors will be recorded as documentation of subsurface contaminant release.

3.3 Quantitative Air Monitoring

Quantitative air monitoring will be performed up- and downwind of the fenced area and any other areas where general or target area survey activities indicate elevated levels of organic vapors.

3 4 00068

Quantitative air monitoring for organics will be performed one time to establish a baseline using Tenax sorbent tubes with 0.8 um prefilters for subsequent particulate analysis. Gilian personal pumps will be operated at 2.0 liters per minute (lpm) for eight hours for standardized comparisons, and at 2.0 lpm throughout the duration of site activities for determination of peak levels. Sorbent tubes will be sealed with end caps, secured with security tape, maintained at 4°C during transportation, and submitted for analysis. In the laboratory, samples will be kept at 4°C until the analysis is performed.

4.0 GROUND-WATER MONITORING

Samples of ground water will be collected initially for chemical analysis from the existing monitoring wells and later from the newly installed monitoring wells at the site. Static water levels will be measured at all monitoring wells before and after selected precipitation events to determine the degree of interaction between the water-bearing zones and surface recharge. After the chemical and physical data are evaluated, an additional monitoring schedule will be developed if needed.

4.1 Sample Containerization

Details of ground-water sample container sizes, types, preservation procedures, and holding times may be found in Attachment 1.

4.2 Static Water Level Measurement

Water level measurements will be made at all ground-water monitoring wells on-site during each routine sampling event prior to collection of any samples and after selected precipitation events.

Static water level measurements at all wells will be made as a group prior to sample collection as well as individual wells before purging and sampling. Measurements will be made to the nearest 0.01 foot with an electric water level indicator, stainless steel tape, or other approved device. All measurements will be made from a permanent reference point on the well casing. All well reference point elevations will be determined from surveyed elevation marks,

referenced vertically to a permanently established benchmark. Total depth will be measured after each well is sampled to determine casing integrity and if siltation has occurred in the well. The measuring device will be decontaminated between each use by following the decontamination procedures provided in Attachment 2 to this sampling plan.

4.3 Well Purging Methods

All wells will be purged before sampling. A pump or bailer will be used for well purging. A Teflon bailer will be used for sampling. If a pump is used to purge, the intake will be located just below the top of the water column and lowered if necessary.

An electric water level indicator will be used to determine depth to water and total depth of the well as described above. Table 1 will be used to determine the total volume of water in the well. This volume will be multiplied by the purging factor to determine purging volume. At a minimum, three to five well volumes will be purged prior to sampling. The temperature, pH, and specific conductance will be monitored during purging. Samples will be collected after the temperature, pH, and specific conductance have stabilized.

Water purged from the wells will be placed in drums or tanks and stored in the support area pending disposal. Depending on the contamination found in the samples, the water may be discarded on-site, or taken off site for appropriate treatment and disposal. The disposition of the drummed water will be determined after the first round of water sample analyses has established levels of

3 4 00071

TABLE 1
LIQUID VOLUME IN A ONE-FOOT SECTION
OF WELL CASING

Casing Inside Diameter (Inches)	(Fluid oz.) [$V=5.22(I.D.)^2$]	Volume of Water (Gallons) [$V=0.0408(I.D.)^2$]	(Milliliters) [$V=154.4(I.D.)^2$]
1	5.22	0.04	154.4
1-1/2	11.74	0.09	347.3
2	20.88	0.16	617.5
3	46.98	0.37	1389.4
4	85.52	0.65	2470.0

contamination. Water will not be disposed of pending approval of the disposal method by U.S. EPA and SCDHEC.

After purging at least three to five well volumes, samples will be collected immediately after the well has recovered sufficiently to allow sampling. Samples will be collected using a Teflon bailer, and subsequently bottled and preserved as provided in Attachment 1.

4.4 Collection of Samples for Chemical Analyses

All sampling and sample processing will be conducted in accordance with the following guidance documents:

1. RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (EPA, September 1986);
2. Methods for Chemical Analysis of Water and Wastes (U.S. EPA March 1983);
3. Test Methods for the Analysis of Solid Waste (SW-846), Third Edition, November 1986;
4. U. S. EPA, Region IV, Engineering Support Branch, Standard Operating Procedures and Quality Assurance Manual, April 1986; and
5. User's Guide to the Contract Laboratory Program (U.S. EPA, October 1984).

The sampling procedures are completely provided in the above documents and are summarized throughout this section.

Sampling procedures for specific compounds or compound groups are discussed below. The preferred order of parameter sampling is given in Table 2.

4.4.1 Samples for Organic Analysis

A wide range of organic parameters will be analyzed in water samples collected in the first sampling event, including volatile organics, acid and base/neutral extractables, pesticides, and PCBs.

Table 3 gives a summary of all laboratory analyses planned for the first and second sampling rounds. U.S. EPA and SCDHEC will approve any reduction in the number of constituents analyzed.

Volatile Organic Compounds

Samples for determination of volatile organic compounds (VOCs) will be removed first from the well after purging. Care will be taken to minimize agitation/aeration of the samples at all stages of removal and containerization. Two replicate samples will be taken at each well (with all splits) with a Teflon bailer. Samples for VOCs will be taken as soon as sufficient water volume is available in the well after appropriate purging, and preserved as required in Attachment 1. All samples collected for organic analysis will be placed in a cooler containing ice as soon as possible after samples are obtained.

Other Organic Compounds

Samples for determination of other organic compounds (including TOC, TOX, and phenols) will be removed from the well as above, placed in the appropriate containers, and preserved as required (see Attachment 1). Phenolics samples will be treated as above. However,

3 4 00074

TABLE 2
ORDER OF PREFERRED SAMPLE COLLECTION

1. Volatile organics (VOCs)
2. Field measurements (Temperature, Specific Conductance, pH)
3. Extractable organics/PCB/Pesticides
4. Metals (Total and Dissolved)
5. TOC
6. TOX
7. Phenols
8. Cyanide
9. Nitrate
10. Sulfate
11. Chloride

TABLE 3
 PLANNED CHEMICAL ANALYSES
 BLUFF ROAD SITE
 COLUMBIA, SOUTH CAROLINA

Organics	Inorganics	Other Analyses	Other
<u>First Sampling Round</u>			
Volatile organic compounds Acid extractables Base/natural extractables Pesticides/Herbicides PCBs Phenols	ICP procedure metals ¹ AA procedure metals ² (As, Hg, Se, Pb) Cyanide	Total Organic Carbon (TOC) Total Organic Halogen (TOX) Nitrate Sulfate Chloride	pH Specific conductance Temperature
<u>Second Sampling Round³</u>			
Volatile organic compounds	ICP procedure metals AA procedure metals Cyanide		pH Specific conductance Temperature

1. Inductively Coupled Plasma procedure, Method 6010. Test Methods for Evaluating Solid Waste, U.S. EPA, Third Edition, November, 1986.
2. Atomic Absorption procedure, Arsenic (Method 7060); Lead (Method 7420); Mercury (Method 7470 [Liquid], Method 7471 [Solid]; and Selenium (Method 7740). Test Methods for Evaluating Solid Waste, U.S. EPA, Third Edition, November 1986.
3. The Final parameter list for the Second Sampling Round will be dependent on the results of sampling round one. Individual parameters may be deleted or added to the list as required by EPA and SCDHEC.

these samples will be handled with a minimum amount of agitation and care will be taken to eliminate any air space in the containers, since they may be semi-volatile.

4.4.2 Inorganics Analyses

Samples for determination of metals, nitrate, sulfate, and chloride will be collected and preserved as provided in Attachment 1.

4.5 Field Measurements

A separate sample will be collected for the field measurement of pH, specific conductance, and temperature after the VOC samples are collected. The first water removed from the well after VOC sampling will be discharged carefully into a clean glass beaker. Appropriate instruments will then be used to measure pH, temperature, and specific conductance. All measurements will be made on-site immediately after the sample is removed from the well, temperature first. All probes will be rinsed with deionized water and wiped clean with laboratory tissue after use at each well and decontaminated before removal from the site. Instruments will be calibrated and maintained according to manufacturers recommendations. The pH meter will be calibrated at the beginning of each day with two buffer solutions, and prior to sample collection and measurement with one buffer solution. Calibration and maintenance events will be recorded in a field log book.

4.6 Field Quality Control Samples

At a minimum, field teams are responsible for the preparation and submittal of four types of QC samples:

- Trip Blanks - One trip blank for every 10 samples collected.
- Equipment/Field Blanks - To ensure the sampling device has been effectively cleaned, fill the device with deionized water or pump deionized water through the device, transfer to sample bottles, preserve and return to the laboratory for analysis. To ensure that outside sources are not contaminating environmental samples (e.g., contamination of ground-water samples by airborne constituents), field blanks will be collected by transferring deionized water into the appropriate sample containers in the field. The samples are then preserved and returned to the laboratory for analysis. At least one set of equipment/field blanks will be prepared for every 10 samples collected in the field.
- Field Duplicates - Prepare one set of duplicate samples for every 10 collected. Label all with unique sample numbers and submit to laboratory without giving cross-referencing data to custodian and without identification as duplicates on parameter request sheet.
- Matrix Spike Samples - Prepare one set of matrix spike samples for every 10 acid and base/neutral extractable organic samples collected. This sample is used for laboratory QA/QC purposes.

4.7 Sample Shipment

Samples will be maintained at 4°C for shipment to the analytical laboratory, and upon receipt placed in a refrigerator at

4°C. Samples will be packaged for shipment in compliance with current Department of Transportation (DOT) and commercial carrier regulations. Individual samples will have the lid secured with tape and sealed in small plastic bags. Samples will be shipped in Coleman-type coolers with packaging material. Each shipping container will be lined with two plastic bags before sample(s) and refrigerant (ice contained in plastic bags or blue ice) are placed in the shipping container. Vermiculite or similar packaging materials, plus a common sense arrangement of plastic and glass bottles, will be used to prevent glass bottles from breaking during shipment. Plastic bags will then sealed with wire twist ties or tape to prevent sample or refrigerant leaking from the shipping container. Sample documentation will be sealed in plastic bags and secured to the underside of the cooler lid. Shipping containers will be sealed using fiberglass packaging tape and signed chain of custody seals will be placed on each side of the cooler. These custody seals will be placed in such a manner that any attempt to open the cooler lid will break the custody seals.

Samples will be shipped via overnight package service or will be transported directly to the analytical laboratory.

5.0 SURFACE WATER, SEDIMENT, AND SURFACE RUNOFF MONITORING

To assess all likely migration pathways of contaminants from the site to off-site surface water, monitoring will be conducted of surface water runoff, surface water streams, and sediment.

5.1 Surface Water Monitoring

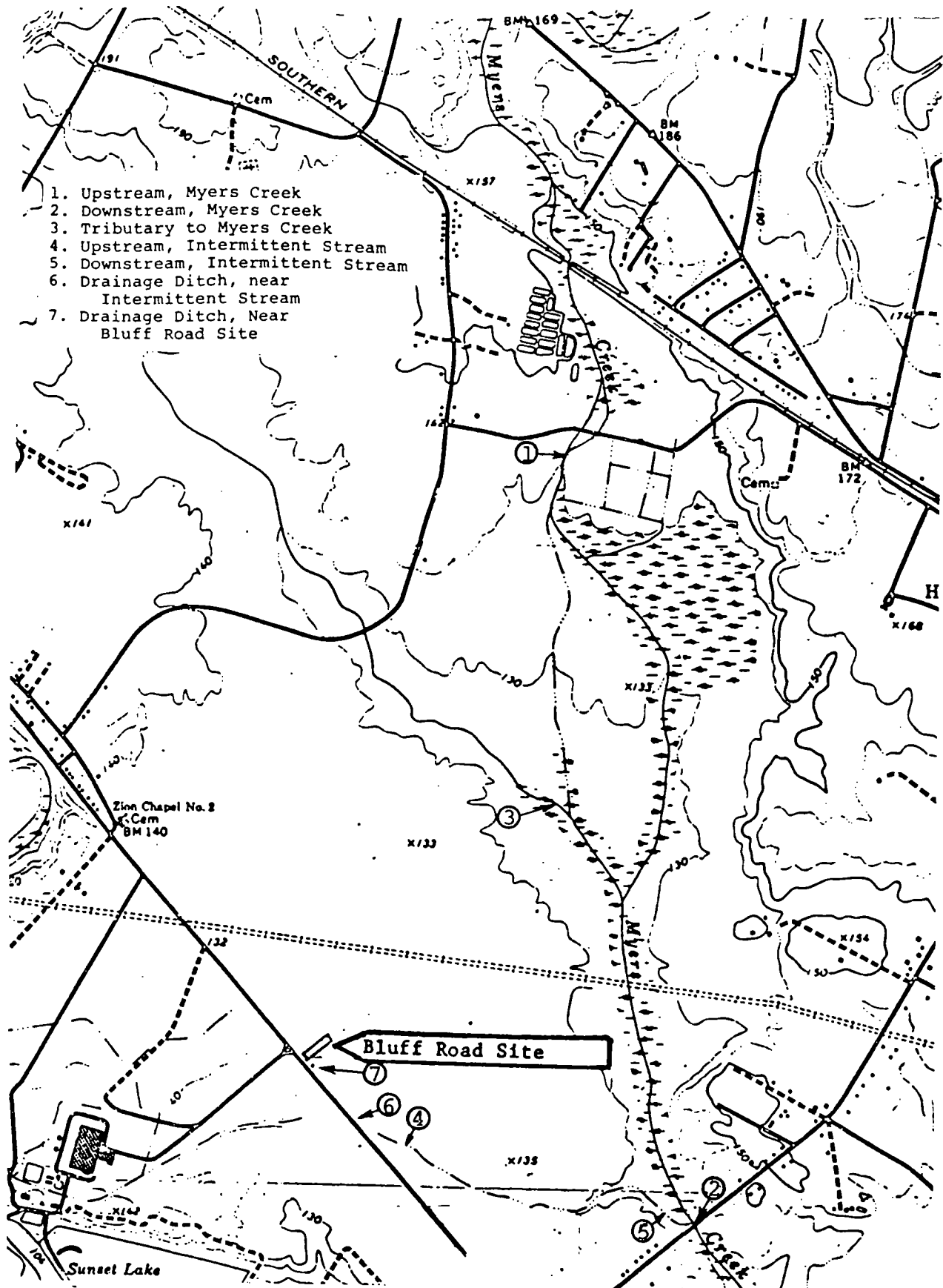
To obtain data necessary to define the contaminant loadings from the site to Myers Creek and the Congree River, surface water sampling will be performed. The contractor will attain site access to the locations which are privately owned prior to sampling.

Surface water sampling will be performed at the following locations if water is available in these water bodies (Figure 2):

- Myers Creek upstream of the confluence with the unnamed tributary to the north of the site.
- Myers Creek downstream of the confluence with the unnamed tributary to the southeast of the site.
- The unnamed tributary just upstream of its confluence with Myers Creek
- The intermittent stream just upstream of the confluence with Myers Creek.
- The intermittent stream just downstream of its confluence with the drainage ditch.

Figure 2 Surface Water and Sediment Sampling Locations at Bluff Road Site.

3 4 00090



- The drainage ditch to the southeast of the site, just upstream of its confluence with the unnamed tributary.
- The drainage ditch just downstream of Bluff Road Site.

Approximate sampling locations are shown on Figure 2. The samples should be analyzed as the contaminants listed under "First Sampling Round" in Table 3.

5.1.1 Sample Container Requirements

Samples will be containerized and preserved following specifications indicated in Attachment 1.

5.1.2 Sampling Procedures

Samples will be collected from these stations directly into the sample bottle whenever possible. VOC samples should be collected first. If the water is too shallow to allow larger sample bottles to be immersed for direct collection, dig a hole with a properly cleaned scoop or shovel to allow for room to immerse the sample bottle. Collect a sediment sample and allow the sediment to settle before collecting water sample. The sample bottle should be held with the opening pointing upstream. The person collecting the sample will stand downstream of the bottle.

5.2 Stream and Surface Runoff Sediment Sampling

To provide an indication of long-term contaminant release from the site, surface stream sediments will be collected from the

following stations:

- At each of the surface water sampling locations (Figure 2).
- From any surface run-off areas at the site proper.

5.2.1 Sediment Sample Container Requirements

The samples will be placed in appropriate glass containers, as described in Attachment 1 and submitted for the analyses listed under First Sampling Round in Table 3. Sample containers will be completely filled with no air space. Caps will have Teflon liners.

5.2.2 Sampling Procedures

Samples at each location will be collected from three points located equidistant along a transect perpendicular to the stream flow. Except for VOCs, samples from each of the three points will be placed in a glass bowl (Pyrex), homogenized by mixing with a stainless steel spoon, and containerized (VOC samples should be gently mixed).

Samples will be collected with either an Ekman Dredge or a Stainless Steel Scoop, depending upon the physical conditions at each location. The criteria for use are as follows:

- Ekman Dredge equipped with six foot rigid extension and triggering device - Appropriate for shallow streams with significant unconsolidated sediment.

3 4 00083

- Stainless Steel Scoop - Appropriate for shallow streams with gravel, clay, or compacted sediment.

Sampling devices will be thoroughly decontaminated between each use as specified in Attachment 2 to this sampling plan.

6.0 SOIL CHARACTERIZATION SAMPLING

In order to identify contaminant concentrations and the general subsurface conditions, samples will be collected in selected areas of the site as follows:

- Soil Borings on-site for chemical analysis
- Soil borings immediately downgradient of the site for chemical analysis.
- Soil borings immediately upgradient of the site for chemical analysis.
- Soil borings from the areas northeast (downgradient) of the site to determine the lateral and vertical extent of the Black Mingo Clay formation and to determine the mineralogy of the formation.

The samples designated for chemical analysis should be analyzed for the contaminants listed under the first sampling round in Table 3.

6.1 Soil Borings for Chemical Analysis

The boreholes will be advanced using a hollow-stem auger [4.25 or 6.25 inches inner diameter (I.D.)] or similar method. Shallow boreholes may be advanced with bucket-type hand augers. Continuous core samples will be obtained using a 2-inch I.D. split-spoon sampler. The split-spoon sampler will be driven in advance of the auger bit. All boreholes will be advanced to the water table of the uppermost aquifer. Chemical results of these cores will be used to define the extent and constituents of soil contamination.

A composite of each split-spoon sample core will be analyzed for the constituents (excluding pH, temperature, specific conductance, TOX, and TOC) in Table 3. In addition, any portion within a split-spoon sample that appears by visual inspection, or monitoring with an OVA and HNu, to be highly contaminated (hot spots) will be sampled separately from the composite for chemical analysis.

Upon completion of these activities, all boreholes will be sealed with a bentonite-cement mixture utilizing the Tremie method to seal the hole. The grout will be tremied into the hole in a step-wise fashion as the augers are being pulled. This approach will enable the boreholes to be sealed without caving.

6.1.1 Sampling Procedures

Each split-spoon sample core will be surveyed visually and with an OVA or HNu, to determine if the core contains highly contaminated areas or "hot spots". If hot spots are detected, that portion of the core will be removed with a stainless steel putty knife and containerized for chemical analysis. Samples will be collected in the order of preferred sample collection as provided in Table 2 (excluding field measurements). Naturally, limited soil volume may preclude the collection of all parameters listed in Table 2.

After the "hot spots" are removed, or if no "hot spots" are found within the soil core, composite samples of the core will be collected by cutting the core lengthwise into halves. Each half will then be cut into equal portions (e.g., 3 six-inch portions for an 18-inch core). All the portions will be placed in a glass (Pyrex) bowl, homogenized by mixing with a stainless steel spoon, and

containerized. A small portion (i.e., one inch) will be cut from each composite aliquot for VOC analysis. These small portions will be gently homogenized to prevent volatilization and then containerized.

Volumes of soil material needed for each sample are provided in Attachment 1.

Sampling utensils and devices will be decontaminated between each use as specified in Attachment 2.

6.2 Soil Borings to Define Black Mingo Clay Formation

Many of these soil borings could be accomplished during operations to install additional downgradient monitoring wells. The soil borings will be advanced to the Black Mingo Clay formation and the elevation of the top of the formation determined. A Shelby Tube sample will then be taken from the Black Mingo Clay formation. This sample will be analyzed to determine the Cation Exchange Capacity and intrinsic permeability of the formation. Particular attention will be paid to ascertaining what effect the organic chemicals present in the ground water will have on the ability of the clay to act as an aquitard.

This phase of the soil investigation should determine if the Black Mingo Clay formation outcrops at the land surface, or is otherwise discontinuous in the area between the site and Myers Creek.

Any soil borings not finished as monitoring wells will be sealed with a bentonite-cement mixture. To ensure a proper seal the Tremie

method will be utilized to seal the borehole. The grout will be tremied down the hole in a step-wise manner as the augers are being pulled to prevent caving of the borehole and to ensure a proper seal.

6.3 Special Requirements for Soil Sampling Activities

In addition to those guidelines contained in the Health and Safety Plan for personnel health and safety protection, the following additional actions will be exercised at all sampling areas of the site.

Each sample area will be designated as Restricted Area - Authorized Personnel Only. The restricted area limits will be established from area to area prior to the sampling activity by the project health and safety officer and will remain in effect until sampling activities in the area are completed. Authorized personnel will be defined as only those individuals required to be present during sampling activities to ensure completion of the sampling task. All other site personnel will not be allowed to enter the restricted area.

All personnel authorized to enter the restricted area will wear the personal protective and safety equipment for the level of protection necessary as determined by the site Health and Safety Officer and the ambient air levels measurements taken during these activities.

Personnel involved in the sampling activities will exercise heavy equipment safety awareness at all times when around moving machinery and equipment (e.g., drill rig, trucks).

7.0 AQUATIC BIOTA SURVEY

The aquatic biota survey will determine the abundance, tolerance, and diversity of fish and benthic macroinvertebrates in the streams at the surface water sampling stations in the vicinity of the site. The survey will be performed during normal flow conditions. For all organisms observed, it will be determined if they are tolerant or intolerant species.

Fish specimens will also be collected in the streams where possible at the surface water sampling stations as described in Section 5.1 (except the drainage ditch stations). A field judgment as to the actual number of sampling locations will be made based on U.S. EPA/SCDHEC approval. The number of stations to be sampled may be reduced by U.S. EPA/SCDHEC due to impossible working conditions. Specimens will be collected over a 24 hour period, identified, counted and released if still alive. Any specimens not alive at the end of the sampling period will be properly disposed of after identification and counting.

Benthic macroinvertebrate organisms will be collected where possible at the surface water sampling stations as described in Section 5.1 except for the drainage ditch stations. Organisms collected will be identified to a general level to determine diversity index, tolerance categorization, and counted to determine abundance.

The contractor will also inventory the fish and benthic macroinvertebrates and determine in-situ measurements of pH, temperature, and conductivity at the surface water sampling locations.

8.0 DECONTAMINATION

This section will address procedures for decontaminating sampling equipment. Description of the decontamination procedures for personnel and large pieces of equipment, such as drilling rigs, are completely discussed in Attachment 2 of this sampling plan. The Health and Safety Plan discusses how the site will be divided for safety purposes.

Decontamination protocols will be strictly adhered to in order to minimize the potential for cross contamination between sampling areas or contamination of areas off-site. Waste materials (e.g., drilling cuttings, fluids, decontamination water) will be disposed of by a method(s) (e.g., landfill, incineration) and at a location(s) which have been approved by EPA and SCDHEC.

8.1 Equipment Decontamination Procedures

8.1.1 General Considerations and Policy

The following general procedures will be adhered to relating to decontamination efforts:

- All decontamination and subsequent use of decontaminated equipment will be documented in a field logbook.
- If visual signs, such as discoloration, indicate that decontamination was insufficient, the equipment will again be decontaminated. If the situation persists, the equipment will be taken out of service.

- All spent rinse water and solvent will be containerized in either temporary covered holding tanks or 55-gallon drums for later disposal.
- All drill cuttings will be containerized on-site in 55-gallon drums and stored on-site for later disposal.
- Verification of the cleaning procedures will be documented by periodic collection of distilled/deionized water passed over a decontaminated sampling tool previously used to sample a location believed to be contaminated. This procedure is described in Section 4.6.
- Decontamination fluids and drill cuttings will be containerized separately in 55-gallon drums. An inventory will be maintained so that the origin of materials in each drum is known. Once the initial analytical results from each well are available, the contents of each drum will be evaluated as to whether the materials are hazardous or non-hazardous. Drums containing hazardous materials will be separated from those determined to be non-hazardous. The drums will be sealed and identified for later disposal. Analysis will be performed on drum contents suspected to be hazardous prior to determining final disposal arrangements.
- All decontaminated equipment will be wrapped in aluminum foil and properly stored when not used.
- Personnel and equipment working within a restricted area must proceed directly to the decontamination area upon completion of work.

- o The outside surfaces of all sample containers that contain environmental samples will be cleaned by wiping the outside surface with a paper towel, or washing with a detergent and deionized water, if necessary.
- o All liquids and solids generated during decontamination will be collected and contained. Fluids produced during large equipment decontamination will be collected and transferred to 55-gallon drums. Fluids produced during small equipment and personnel decontamination will be placed directly into 55-gallon drums. The collected fluids will be stored at designated on-site locations for later disposal.
- o Solids resulting from personnel decontamination and un reusable field equipment will be placed in plastic bags. These bags will be stored in 55-gallon salvage drums at designated locations for later disposal.
- o All solids and liquids generated by site activities (e.g., disposable clothing, wash water, unusable solid samples, and fluids removed from monitor wells during drilling and well development) will be properly contained (solids and liquids will be contained separately) and containers labeled and stored at designated on-site and/or off-site locations for later disposal. Ultimate on-site disposal of the RI generated wastes will proceed at the direction of U. S. EPA and SCDHEC.

8.1.2 Hand Tools

Wooden tools (e.g., shovel and hammer handles) are difficult to decontaminate because they absorb chemicals. They should be kept on

site and handled only by protected workers. At the end of the project, wooden tools will be disposed of with RI generated wastes, and tools (working and non-working ends) will be decontaminated between sampling activities using the same techniques as described for sampling equipment.

8.1.3 Respirators

Certain parts of contaminated respirators, such as the harness assembly and leather or cloth components, are difficult to decontaminate and therefore require special attention. Rubber components will be soaked in a nonphosphate soap and water solution and scrubbed with a brush. Regulators will be maintained according to manufacturers recommendations. Personnel responsible for decontaminating respirators will be thoroughly trained in respirator maintenance. Manufacturer's instructions will be followed to sanitize each respirator mask between uses. When not being used, each sanitized respirator will be stored in a sealed protective plastic bag. Each individual assigned a respirator will be responsible for adhering to these procedures and is ultimately responsible for respirator care and maintenance. Respirator cartridges will be replaced as needed and used cartridges will be disposed of with protective clothing as described in Section 8.1.4.

8.1.4 Protective Clothing

All protective clothing will be of the disposable type and after use will be placed in plastic bags within 55 gallon drums for later disposal.

8.1.5 Heavy Equipment

Drill rigs, and other heavy equipment are difficult to decontaminate. The method generally used is to wash them with a steam cleaner and to scrub accessible parts with detergent/water solution under pressure, if necessary. Equipment will be washed on a decontamination pad and the liquids collected.

Particular care will be given to those components in direct contact with contaminants such as tires and scoops.

8.1.5.1 Drilling and Well Installation Equipment

This equipment should be decontaminated as specified in Attachment 2 of this sampling plan.

8.1.6 Ground-Water Sampling Equipment

This equipment should be decontaminated as specified in Attachment 2 of this sampling plan.

8.2 Personnel Decontamination Procedures

Decontamination procedures developed by the U.S. EPA as presented in "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities", U.S. Department of Health and Human Resources, 1985 should be implemented.

Personnel decontamination levels anticipated at this site are predominantly Levels C and D. These procedures as well as other applicable decontamination procedures are presented in the site-specific Health and Safety Plan.

9.0 FIELD DOCUMENTATION

It is necessary to document all activities performed in collection of environmental samples during this field remedial investigation. Field documentation is paramount to performing future activities as part of the complete study. Samples will be properly collected, all conditions recorded, labels affixed to each container, and samples will be submitted to the analytical laboratory following chain-of-custody procedures.

9.1 Field Logbooks

Bound and numbered field logbooks will be kept to serve as detailed records of the actual sampling procedures used, the sampling conditions, and any problems that may have occurred during the sampling activities. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number and will only be used on this project.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site and the purpose of their visit will be recorded in the field logbook as well.

Measurements made and samples collected will be recorded. All entries will be made in ink. If an incorrect entry is made, the information will be crossed out and initialed, and the correct entry made. The approximate location where a sample is collected or a measurement is made will be recorded in a field logbook.

Samples will be collected following specified procedures. Variation from the procedures will be noted. The equipment used to collect samples will be recorded, along with the time of sampling, sample description, depth at which the sample was collected, volumes, and numbers of containers. Sample identification numbers will be assigned prior to sample collection. Duplicates will be included in the daily sequence for sample identification and will not specifically be distinguished as a duplicate sample on field chain-of-custody forms, which are included with all environmental samples submitted to the laboratory. Records will be maintained of all duplicate field samples in the on-site Manager's bound and numbered field notebook.

9.2 Sample Identification

Each sample collected will have a completed sample identification label affixed. Each sample will have a unique sample number assigned to it.

9.3 Photographs

Photographs of the sampling station with respect to surrounding area and relative to objects used to locate the station will be taken. The picture number and roll number will be logged in the field logbook to identify which sampling site is depicted in the photograph. In the field logbook, a notation to indicate a reference to the north of each photograph should be made.

3 4 00096

9.4 Sample Documentation Forms

All samples collected in this project will be recorded in the field logbooks and on the field sample chain-of-custody forms. Chain-of-custody forms will be enclosed in plastic bags and taped to underside of the shipping container lid.

References

- 1) U. S. EPA. March 1983. Methods for Chemical Analysis of Water and Wastes. 600/4-79-020.
- 2) U.S. EPA. April 1986. Engineering Support Branch, Standard Operating Procedures and Quality Assurance Manual. Region IV.
- 3) U.S. EPA. September 1986. RCRA Ground-water Monitoring, Technical Enforcement Guidance Document.
- 4) U.S. EPA. November 1986. Test Methods for Evaluating Solid Waste. SW-846. Third Edition.

3 4 00098

ATTACHMENT 1

Recommended Sample Containers, Sample Preservation, Sample Holding Times, and Permissible Sample Types

(Source: Appendix A, Engineering Support Branch, Standard Operating Procedures and Quality Assurance Manual, U.S. EPA, Region IV, April 1986).

APPENDIX A
RECOMMENDED SAMPLE CONTAINERS, SAMPLE PRESERVATION, SAMPLE HOLDING TIMES, AND
PERMISSIBLE SAMPLE TYPES

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Concentrated Waste Samples</u>					
Organic Compounds	8-oz. widemouth glass with Teflon liner	None	ASAP	G or C	A
Metals and Other Inorganic Compounds	8-oz. widemouth glass with Teflon liner	None	ASAP	G or C	A
EP Toxicity	8-oz. widemouth glass with Teflon liner	None	ASAP - NS	G or C	B
Flash Point and/or Heat Content	8-oz. widemouth glass with Teflon liner	None	ASAP - NS	G	B
<u>Fish Samples</u>					
Organic Compounds	Wrap in aluminum foil	Freeze	ASAP	G or C	A
Metals and Other Inorganic Compounds	Place in plastic zip-lock bag	Freeze	ASAP	G or C	A
<u>Liquid - Low to Medium Concentration Samples</u>					
Alkalinity	500-ml or 1-liter poly-ethylene with polyethylene or polyethylene lined closure	Cool, 4°C	14 days	G or C	C
Acidity	500-ml or 1-liter poly-ethylene with polyethylene or polyethylene lined closure	Cool, 4°C	14 days	G or C	C
Bacteriological	250-ml glass with glass closure or plastic capable of being autoclaved	Cool, 4°C	6 hrs.	G	C

3 4 00099

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Liquid - Low to Medium Concentration Samples (Continued)</u>					
Static Bioassay	1-gal. amber glass (not solvent rinsed)	Cool, 4°C	48 hrs.	G or C	D
Biochemical Oxygen Demand (BOD)	1/2-gal. polyethylene ¹ with polyethylene closure	Cool, 4°C	48 hrs.	G or C	C
Chloride	500-ml or 1-liter poly- ethylene with polyethy- lene or polyethylene lined closure	None	28 days	G or C	C
Chlorine Residual	In-situ, beaker or bucket	None	Analyze Immediately	G	C
Color	500-ml or 1-liter poly- ethylene with polyethy- lene or polyethylene lined closure	Cool, 4°C	48 hrs.	G or C	C
Conductivity	500-ml or 1-liter poly- ethylene with polyethy- lene or polyethylene lined closure	Cool, 4°C	28 days (determine on site if possible)	G or C	C
Chromium, Hexavalent	1-liter polyethylene with polyethylene closure	Cool, 4°C	24 hrs.	G	C
Cyanide	1-liter or 1/2-gallon polyethylene with poly- ethylene or polyethylene lined closure	Ascorbic Acid ^{2,3} Sodium Hydroxide, pH >12 Cool, 4°C	14 days	G	C

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Liquid - Low to Medium Concentration Samples (Continued)</u>					
Dissolved Oxygen (Probe)	In-situ, beaker or bucket	None	Determine On Site	G	C
Dissolved Oxygen (Winkler)	300-ml glass, BOD bottle	Fix on site, store in dark	8 hrs. (determine on site if possible)	G	C
EP Toxicity	1-gal. glass (amber) with Teflon liner	Cool, 4°C	ASAP - NS	G or C	B
Fluoride	1-liter polyethylene or ¹ 1/2-gal. polyethylene with polyethylene or polyethylene lined closure	None	28 days	G or C	C
Hardness	500-ml or 1-liter polyethylene with polyethylene or polyethylene lined closure	50% Nitric ² Acid, pH <2	6 months	G or C	C
LAS	500-ml or 1-liter polyethylene with polyethylene or polyethylene lined closure	Cool, 4°C	48 hrs.	G or C	C
Metals*	1-liter polyethylene with polyethylene lined closure	50% Nitric ² Acid, pH <2	6 months	G or C	C
Metals, Dissolved	1-liter polyethylene with polyethylene lined closure	Filter-on-site ² 50% Nitric Acid, pH <2	6 months	G	C

* Holding time for Mercury analysis is 28 days.

.3 4 00102

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Liquid - Low to Medium Concentration Samples (Continued)</u>					
Nutrients ⁴	1-liter polyethylene or 1/2-gal. polyethylene with polyethylene or polyethylene lined closure	50% Sulfuric ² Acid, pH <2 Cool, 4°C	28 days	G or C	C
Oil and grease	1-liter widemouth glass with Teflon liner	50% Sulfuric ² Acid, pH <2 Cool, 4°C	28 days	G	C
Organic Compounds - Extractable and Pesticide Scan					C
No Residual Chlorine Present	1-gal. amber glass or 2 1/2-gal. amber glass with Teflon liner	Cool, 4°C	47 days ⁵	G or C	C
Residual Chlorine Present	1-gal. amber glass or 2 1/2-gal. amber glass with Teflon liner	Add 3 ml 10% sodium thiosulfate per gallon Cool, 4°C	47 days ⁵	G or C	C
Organic Compounds - Purgeable (VOA)					
No Residual Chlorine Present	2 40-ml vials with Teflon lined septum caps	4 drops conc. hydrochloric acid, Cool, 4°C	14 days	G	C
No Residual Chlorine Present	2 40-ml vials with Teflon lined septum caps	Cool, 4°C	7 days	G	C
Residual Chlorine Present	2 40-ml vials with Teflon lined septum caps	Footnote 6	14 days	G	C

3 4 00103

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Liquid - Low to Medium Concentration Samples (Continued)</u>					
Organic Compounds - Specified and Pesticides (Non-Priority Pollutants such as Herbicides)	1-gal. glass (amber) or 2 1/2-gal. glass (amber) with Teflon lined closure	Footnote 7	47 days ⁷	G or C	C
Organic Halides - Total (TOX)	250-ml amber glass with Teflon lined septum closure	Cool, 4°C	ASAP - NS	G	E
pH	In-situ, beaker or bucket	None	Analyze Immediately	G	C
Phenols	1-liter amber glass with Teflon lined closure	50% Sulfuric Acid, pH <2 Cool, 4°C	28 days	G	C
Phosphate-Ortho	500-ml or 1-liter polyethylene with polyethylene or polyethylene lined closure	Filter-on-site Cool, 4°C	48 hrs.	G	C
Phosphorus, Total Dissolved	500-ml or 1-liter polyethylene with polyethylene or polyethylene lined closure	Filter-on-site 50% Sulfuric Acid, pH <2 Cool, 4°C	28 days	G	C
Solids, Settleable	1/2-gal. polyethylene with polyethylene closure	Cool, 4°C	48 hrs.	G or C	C

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Liquid - Low to Medium Concentration Samples (Continued)</u>					
Solids (Total and Suspended, etc.)	500-ml or 1-liter poly-1 ethylene with polyethylene or polyethylene lined closure	Cool, 4°C	7 days	G or C	C
Sulfates	500-ml or 1-liter poly-1 ethylene with polyethylene or polyethylene lined closure	Cool, 4°C	28 days	G or C	C
Sulfides	500-ml or 1-liter poly-2 ethylene with polyethylene or polyethylene lined closure	2 ml Zinc Acetate ² Conc. Sodium Hydroxide to pH >9 Cool, 4°C	7 days	G	C
Temperature	In-situ, beaker or bucket	None	Determine On Site	G	C
Turbidity	500-ml or 1-liter poly-1 ethylene with polyethylene or polyethylene lined closure	Cool, 4°C	48 hrs.	G or C	C
<u>Soil, Sediment or Sludge Samples - Low to Medium Concentration</u>					
E. P. Toxicity	8-oz. widemouth glass with Teflon [®] lined closure	Cool, 4°C	ASAP - NS	G or C	B
Metals	8-oz. widemouth glass with Teflon [®] lined closure	Cool, 4°C	6 months	G or C	A

3 4 00105

<u>Parameter</u>	<u>Container</u>	<u>Preservative</u>	<u>Holding Time</u>	<u>Permissible Sample Type</u>	<u>Reference</u>
<u>Soil, Sediment or Sludge Samples - Low to Medium Concentrations (Continued)</u>					
Nutrients Including: Nitrogen, Phosphorus, Chemical Oxygen Demand	500-ml polyethylene with polyethylene closure or 8 oz. widemouth glass with Teflon lined closure	Cool, 4°C	ASAP	G or C	A
Organics - Extractable	8-oz. widemouth glass with Teflon liner	Cool, 4°C	ASAP	G or C	A
Organics - Purgeable (VOA)	4-oz. (120 ml) widemouth glass with Teflon liner	Cool, 4°C	ASAP	G or C	A
Other Inorganic Compounds - Including Cyanide	500-ml polyethylene with polyethylene closure or 8-oz. wide-mouth glass with Teflon lined closure	Cool, 4°C	ASAP	G or C	A

Abbreviations: G = Grab
 C = Composite
 ASAP = As Soon As Possible
 NS = Not Specified

Footnotes:

1. Use indicated container for single parameter requests, 1/2-gallon polyethylene container for multiple parameter requests except those including BOD, or 1-gallon polyethylene container for multiple parameter request which include BOD.
2. Must be preserved in the field at time of collection.
3. Use ascorbic acid only if the sample contains residual chlorine. Test a drop of sample with potassium iodide-starch test paper; a blue color indicates need for treatment. Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.6 g of ascorbic acid for each liter of sample volume.
4. May include nitrogen series (ammonia, total Kjeldahl nitrogen, nitrate-nitrite), total phosphorus, chemical oxygen demand and total organic carbon.
5. Samples must be extracted within seven days and extract must be analyzed within 40 days.
6. Collect the sample in a 4 oz. soil VOA container which has been pre-preserved with four drops of 10 percent sodium thiosulfate solution. Gently mix the sample and transfer to a 40 ml VOA vial that has been pre-preserved with four drops concentrated HCl, cool to 4°C.
7. See Organic Compounds - Extractable (page 4 of 8). The Analytical Support Branch should be consulted for any special organic compound analyses in order to check on special preservation requirements and or extra sample volume.

References:

- A. US-EPA, Region IV, Environmental Services Division, "Analytical Support Branch, Operations and Quality Control Manual," June 1, 1985 or latest version.
- B. EPA Method 1310, Extraction Procedures, "SW 846," US-EPA, Office of Solid Wastes, Washington, DC, 1982.
- C. 40 CFR Part 136, Federal Register, Vol. 49, No. 209, October 26, 1984.
- D. US-EPA, Region IV, Environmental Services Division, "Ecological Support Branch, Standard Operating Procedures Manual," latest version.
- E. EPA Interim Method 450.1, "Total Organic Halide," US-EPA, ORD, EMSL, Physical and Chemical Methods Branch, Cincinnati, Ohio, November 1980.

Attachment 2

Decontamination Procedures

(Source: Appendix B, Engineering Support Branch, Standard Operating Procedures and Quality Assurance Manual, U.S. EPA, Region IV, April 1986).

1.0 DEFINITION OF CLEANING MATERIALS

Laboratory detergent shall be a standard brand of phosphate-free laboratory detergent such as Alquinox or Liquinox.

Nitric acid solutions (10 percent) shall be made from reagent-grade nitric acid and deionized water.

Standard cleaning solvent shall be pesticide-grade isopropanol. However, solvents may be substituted for a particular investigation if needed. Pesticide-grade acetone or methanol are both acceptable. However, it should be noted that if pesticide-grade acetone is used, the detection of acetone in samples collected with acetone rinsed equipment is suspect. Pesticide-grade methanol is much more hazardous to use than either pesticide-grade isopropanol or acetone, and its use is discouraged. Pesticide-grade hexane and petroleum ether are not miscible with water; therefore, these two solvents are not effective rinsing agents unless equipment is dry. The use of any solvent other than pesticide-grade isopropanol for equipment cleaning purposes must be justified and its use must be documented in field logbooks and inspection or investigation reports.

Tap water may be used from any municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute for tap water.

Deionized water is defined as tap water that has been treated by passing through a standard deionizing resin column. The deionized water should contain no heavy metals or other inorganic compounds (i.e., at or above analytical detection limits). The deionized water should also be organic-free, which is defined as tap water that has been treated with activated carbon and deionizing units.

3 4 00109

Organic-free water should contain no pesticides, herbicides, extractable organic compounds, and less than 50 ppb of purgeable organic compounds as measured by low level GC/MC scan.

3 4 00110

2.0 DECONTAMINATION OF WELL SOUNDERS, MEASURING TAPES, AND
SUBMERSIBLE PUMPS

1. Wash with laboratory detergent and tap water.
2. Rinse with tap water.
3. Rinse with deionized water.
4. Equipment should be placed in a polyethylene bag or wrapped with polyethylene film to prevent contamination during storage or transit.

3.0 DECONTAMINATION OF DRILLING RIGS*

1. The engine and power head should be cleaned with a power washer, steam jenny, or hand washed with a brush using detergent (does not have to be laboratory detergent but should not be a degreaser) to remove oil, grease, and hydraulic fluid from the exterior of the unit. These units should be rinsed thoroughly with tap water.
2. All auger flights, auger bits, drilling rods, drill bits, hollow stem augers, Split Spoon Samples, Shelby Tubes, or other parts of the drilling equipment that will contact the soil or ground water should be cleaned as follows:
 - a. Wash equipment thoroughly with laboratory detergent and hot water using a brush to remove any particulate matter or surface film.
 - b. Rinse equipment thoroughly with hot tap water.
 - c. Rinse equipment thoroughly with deionized water
 - d. Rinse equipment twice with solvent and allow to air dry for at least 24 hours. If time does not allow for air drying, a second distilled rinse will suffice.
 - e. Wrap equipment completely with aluminum foil to prevent contamination during storage and/or transport to the field.
 - f. Rinse the stainless steel or metal sampling equipment thoroughly with tap water in the field as soon as possible after use.

3 4 00112

- * When this sampling equipment is used to collect samples that contain oil, grease or other hard to remove materials, it may be necessary to rinse the equipment several times with pesticide grade acetone to remove the materials before proceeding with Step 1. In extreme cases, when equipment is painted, badly rusted, or coated with materials that are difficult to remove, it may be necessary to steam clean, wire brush, or sandblast equipment before proceeding with Step 1. Any stainless steel sampling equipment that cannot be cleaned using these procedures should be discarded.

4.0 DECONTAMINATION OF FIELD SAMPLING EQUIPMENT (e.g., bailers, scoops, compositing apparatus).

4.1 Decontamination of Teflon, stainless steel, or metal equipment used to collect samples for trace organic compounds and trace metals analyses.

1. Equipment will be washed thoroughly with laboratory detergent and tap water using a brush to remove any particulate matter or surface film.
2. The equipment will be rinsed thoroughly with tap water.
3. Rinse equipment with deionized water.
4. Rinse equipment twice with solvent.
5. Rinse equipment thoroughly with organic-free water and allow to air dry as long as possible.
6. If organic-free water is not available, allow equipment to air dry as long as possible. Do not rinse with deionized or distilled water.
7. Wrap equipment completely with aluminum foil, if appropriate, to prevent contamination during storage and/or transport.

* - When this sampling equipment is used to collect samples that contain oil, grease or other hard to remove materials, it may be necessary to rinse the equipment several times with pesticide-grade acetone to remove the materials before proceeding with Step 1. In extreme cases, it may be necessary to steam clean the field equipment before proceeding with Step 1. If the field equipment cannot be cleaned utilizing these procedures, it should be discarded.

** - Small and awkward equipment such as vacuum bottle inserts and well bailers may be soaked in the nitric acid solution instead of being rinsed with it. Fresh nitric acid solution should be prepared for each cleaning session.

4.2 Decontamination of Stainless Steel or Metal Equipment*

1. Wash equipment thoroughly with laboratory detergent and hot water using a brush to remove any particulate matter or surface film.
2. Rinse equipment thoroughly with hot tap water.
3. Rinse equipment thoroughly with deionized water.
4. Rinse equipment twice with solvent and allow to air dry for a least 24 hours. If time does not allow for air drying, a second distilled water rinse will suffice.
5. Wrap equipment completely with aluminum foil to prevent contamination during storage and/or transport to the field.

6. Rinse the stainless steel or metal sampling equipment thoroughly with tap water in the field as soon as possible after use.

* - When this sampling equipment is used to collect samples that contain oil, grease or other hard to remove materials, it may be necessary to rinse the equipment several times with pesticide grade acetone to remove the materials before proceeding with Step 1. In extreme cases, when equipment is painted, badly rusted, or coated with materials that are difficult to remove, it may be necessary to steam clean, wire brush, or sandblast equipment before proceeding with Step 1. Any stainless steel sampling equipment that cannot be cleaned using these procedures should be discarded.